REMARKS

The Office Action dated March 31, 2009 has been received and noted. Claims 1-22 are pending. Independent claims 1 and 12 were amended. No new matter was added. Support for the claim amendments may be found in paragraphs 130, 157 and 160 of the Specification.

The foregoing amendment and the following remarks are being submitted as a full and complete response to the Office Action. Authorization is granted to charge counsel's Deposit Account No. 01-2300, referencing Attorney Docket No. 030687-00566, for any additional fees necessary for entry of this Response. Reconsideration of this application is requested.

Claim Rejections under 35 U.S.C. §§ 102 and 103

In the Office Action, claims 1, 4-10, 12 and 15-21 stand rejected under 35 U.S.C. § 102(e) as being anticipated by Hulden, International Application Publication No. WO02/075470. Claims 2, 11, 13 and 22 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Hulden in view of Kurtzberg. Claims 3 and 14 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Hulden in view of Kurtzberg and further in view of Okumura, U.S. Patent No. 4,674,048. Applicants respectfully traverse these rejections and request reconsideration.

Independent claims 1 and 12 were amended to clarify the subject matter for which protection is being sought. In particular, claims 1 and 12 were amended to recite that a robot cleaner determines "which part of the map has a highest percentage of non-traveled cells; and using the map to calculate a travel path to the part of the map that has a highest percentage of non-traveled cells." Applicants submit that Hulden, Kurtzberg and Okumura, taken alone or in combination, do not disclose or even suggest the claimed subject matter.

In contrast, Hulden discloses an energy-efficient method for navigation of an autonomous cleaning apparatus. According to the method, the area is divided into cells, each of which is being indicated as cleaned, uncleaned or occupied by an obstacle. See page 12, lines 27-29. The navigation route to the uncleaned cell is determined using a predetermined energy cost function. See page 13, lines 6-8. The cleaning apparatus is then navigated to the uncleaned cell according to the navigation route. Preferably, the energy cost function depends both on the distance from the current cell to the uncleaned cell as well as the total change of direction required for moving thereto (i.e., a larger change of direction, a larger distance being given a larger cost). See page 13, lines 10-16. In other words, Hulden teaches that cells, cleaning of which requires the smallest amount of energy, are cleaned first, followed by the cells which require more energy.

This energy-based approach for determining travel path differs significantly from the technique recited in claims 1 and 12 of the present application in which the cleaning machine uses a map to determines which part of a map has a highest percentage of non-traveled cells and calculate a travel path to the part of the map that has a highest percentage of non-traveled cells. It also determines if the travel path is free from obstructions, and, if the path is obstructed, rotates the travel path by a predetermined number of degrees and recalculates the travel path. The claimed mechanism has does not rely on energy saving or other methods disclosed in Hulden.

Kurtzberg discloses a method for optimizing an operation of a self-guided vehicle. The vehicle creates a map of the encompassing region and its target destination using various sensors. See col. 3, lines 5-7. The system then superimposes a cell grid on the map. The location of the vehicle is in a particular cell and the target is located in another cell. The vehicle moves from cell to cell from its current location to its target location following a path of least resistance to its movement, as described below. See col. 3, lines 12-20. Specifically, the system constructs a

weighted-edge graph from the cells. The nodes of this graph designate the cells and the connecting edges represent the linkages to adjacent cells that can be directly reached. See col. 3, lines 39-42. The root node of the graph is associated with the cell in which the vehicle is currently located. The task for the vehicle is to traverse from the root node to the target node i.e., the node representing the target cell, so as to minimize the sum of the weighted graph edges of the traversed nodes. See col. 3, lines 49-53. Computation of the minimum path tree establishes a connection from the root node to the target node. See col. 3, lines 66-67.

However, Kurtzberg does not disclose or suggest that a cleaning machine determines which part of a map has a highest percentage of non-traveled cells and calculate a travel path to the part of the map that has a highest percentage of non-traveled cells. Kurtzberg also does not disclose or even suggest that cleaning machine uses a map to determine if the travel path is free from obstructions, and, if the path is obstructed, rotating the travel path by a predetermined number of degrees and recalculating the travel path, as recited in claims 1 and 12 of the present application. In fact, not only does Kurtzberg fail to disclose or suggest any automated method of dealing with path obstructions, it does not even mention the concept of obstructions. In contrast, Kurtzberg discloses that if the target node associated with the target cell is not reachable, the implication is that the graph containing the root node and the target node is not connected; that is, there is no possible path from the root node to the target node. Such information is supplied to the control base (e.g., humans). See col. 4, lines 8-13. This human-assisted approach to vehicle navigation differs significantly from the automated technique recited in claims 1 and 12.

Okumura disclose a control system for a mobile robot that causes the robot to automatically run along a predetermined path and in a selected direction. The control system comprises position identification means for sensing a distance travelled by the robot and a

change in a direction of travel of the robot, calculating a position of the robot in two-dimensional coordinates in response to the sensed distance and the sensed change in direction, and generating a position signal representative of the robot position. Obstruction sensor means senses an obstruction to generate an obstruction signal. Storage means stores a map consisting of a number of unit blocks which are defined by parallel columns and parallel rows in the two-dimensional coordinates. Operation means causes the robot to sequentially move back and forth along one of the columns and rows of the map in the range stored in the map, while sequentially shifting the robot to one of the subsequent columns and rows. Non-travelled region discriminating means discriminates a non-travelled region by reading out a travelled region out of the storage means and comparing the travelled region with the range to be travelled. Third operation means returns the robot to a non-travelled region to cause the robot to resume reciprocation when the non-travelled region is present on an extension of a travelled column, at one of an instant when an obstruction ahead the robot disappears and an instant when the travel of the robot in the range to be travelled is completed. See col. 2, lines 5-50 of Okumura.

However, Okumura does not disclose or even suggest that the robot determines which part of a map has a highest percentage of non-traveled cells and calculate a travel path to the part of the map that has a highest percentage of non-traveled cells. Okumura also does not disclose that robot uses a map to determine if the travel path is free from obstructions, and, if the path is obstructed, rotating the travel path by a predetermined number of degrees and recalculating the travel path, as recited in claims 1 and 12 of the present application.

At least for these reasons, claims 1 and 12 as well as the claims dependent thereon are patentable over Hulden, Kurtzberg and Okumura, alone or the alleged combination thereof.

Conclusion

Accordingly, Applicants respectfully submit that claims 1-22 are in condition for allowance and a Notice of Allowability is earnestly solicited. If for any reason the Examiner determines that the application is not now in condition for allowance, it is respectfully requested that the Examiner contact the Applicants' undersigned counsel at the telephone number, indicated below, to arrange for an interview to expedite the disposition of this application.

Respectfully submitted,

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ARENT FOX LLP

Michael Fainberg
Arent Fox LLP
1675 Broadway
New York, New York 10019
Direct Tel. No.: (212) 484-3927
Fax No.: (212) 484-3990
Registration No.: 50,441
Customer No.: 38,485